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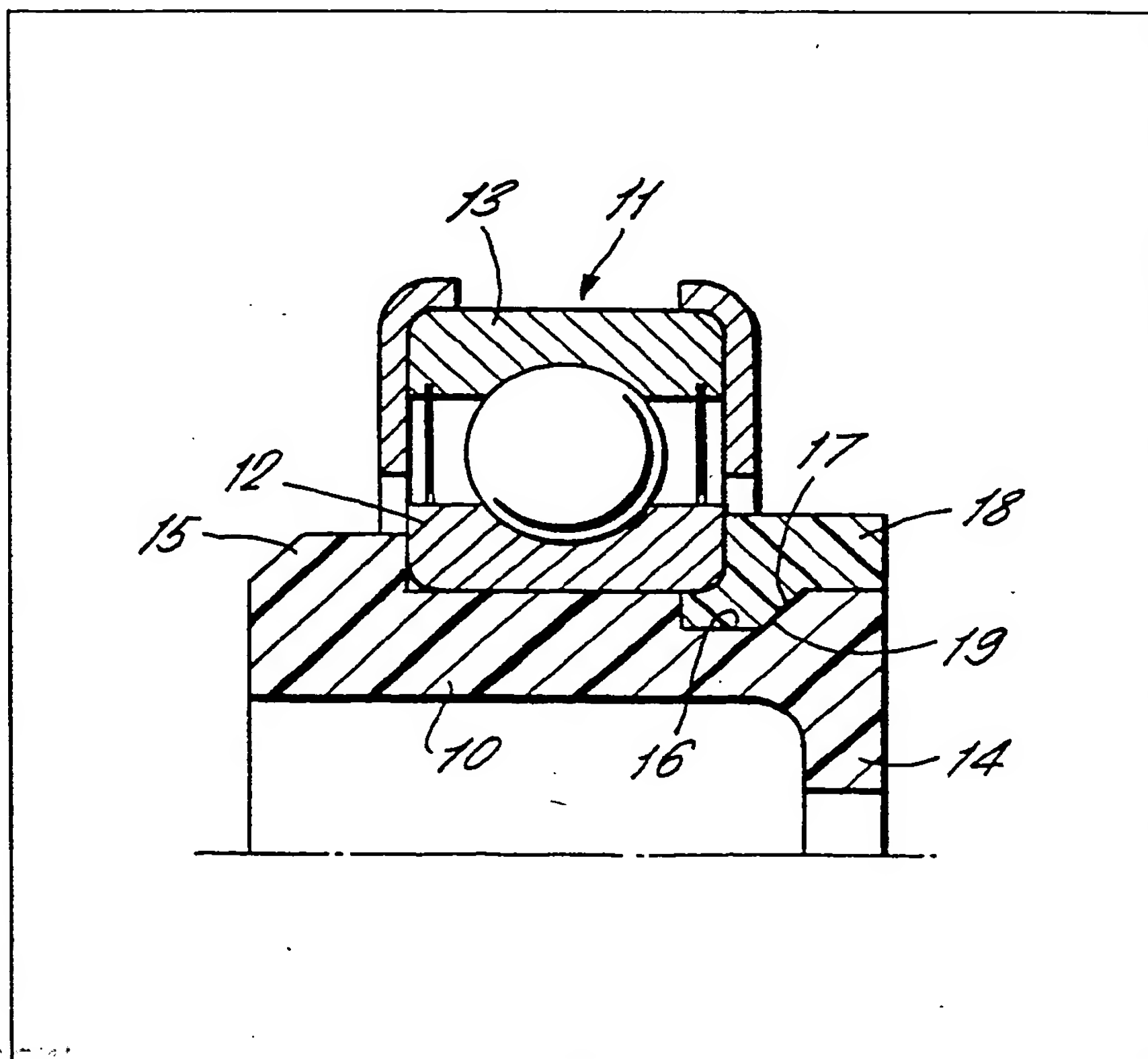
(54) **A combination of a support body and a pulley body and a method of assembling them**

(57) An annular pulley body (13) is mounted on and for rotation relative to a support body (10) by a bearing (11) having a bearing ring (12) seated on the support body. The support body (10) has an abutment (15) and an annular groove (16) at opposite ends of the bearing ring (12). A securing

ring (18) is disposed in the groove (16) in a radially expanded form. The securing ring (18) and the groove (16) have co-operating inclined surfaces (17, 19) such that upon contraction of the securing ring it urges the bearing ring towards the abutment.

To avoid the disadvantages of a broken or split ring having an inclined surface, the securing ring (18) is endless and contracts or is caused to contract whilst it is in the groove (16).

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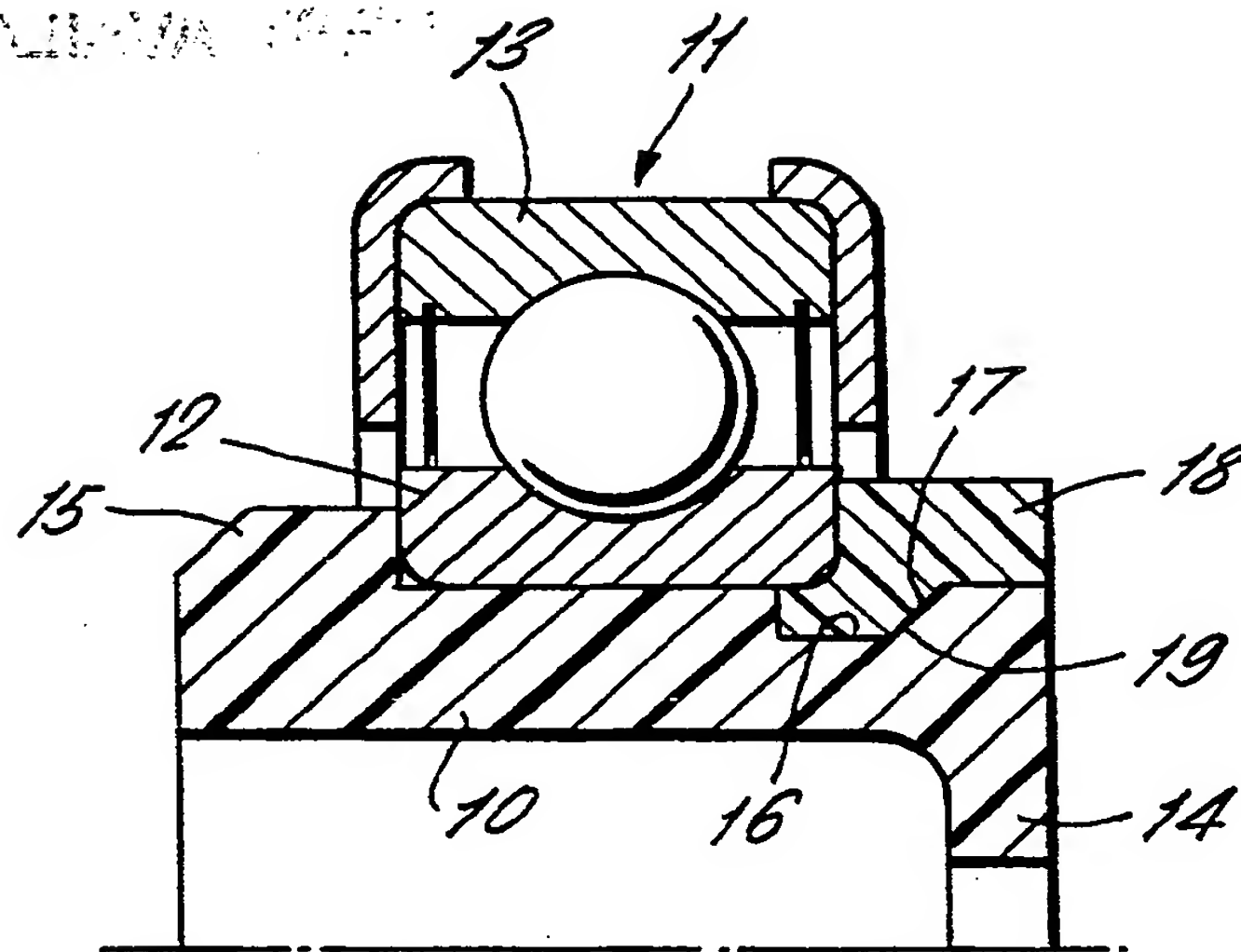
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FIG. 1



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FIG. 2

# SPECIFICATION

## A combination of a support body and a pulley body and a method of assembling them

This invention concerns a combination of a support body and an annular pulley body mounted on and for rotation relative to the support body by a bearing having a bearing ring seated on the support body, and a method of assembling the combination.

- 5 Patent Specification U.S. 2509081 discloses the use of a broken or split ring having an inclined or tapered end face. The ring is used to secure axially in one direction a part mounted on a shaft or disposed in a bore. The ring is radially resiliently expanded or contracted and placed in a groove also having an inclined or tapered surface. Upon contraction or expansion of the ring towards the base of the groove, the inclined or tapered surfaces co-operate to move the ring axially and so secure or hold a part on a shaft or in a bore. However, the part is securely and reliably held only to the extent allowed by how easily the ring can be resiliently expanded or contracted. Particularly in the case where the part is subject to vibrations and alternating loads, which can act continuously, the part and the ring can become undesirably loosened. Furthermore the part can tilt since the ring yields particularly easily in the vicinity of the free ends. Also the ring can be forced out of the groove by a load acting against the ring and causing it to expand or contract because of the inclined or tapered surfaces.

- The subject of this invention is an annular pulley body mounted on and for rotation relative to a support body by a securing ring providing a uniform axial load and which cannot become loose.

- In one aspect, the invention provides in a method of assembling a combination of a support body and an annular pulley body mounted on and for rotation relative to the support body by a bearing having a bearing ring seated on the support body, the steps of fixing the bearing ring on the support body by:

- i) producing the support body having an abutment, a seating surface for the bearing ring and an annular groove, the seating surface being positioned between the abutment and annular groove, and the annular groove having an inclined surface converging with the axis in the direction towards the abutment;

(ii) mounting the bearing ring on the seating surface and against the abutment; and

- (iii) providing a securing ring in the groove, the securing ring having an inclined surface co-operating with that of the groove such that upon contraction of the securing ring it moves towards the bearing ring, wherein the securing ring is endless and it contracts or is caused to contract whilst it is in the groove.

In another aspect, the invention provides, in combination, a support body, an annular pulley body mounted on and for rotation relative to the support body by a bearing having a bearing ring

- 65 seated on the support body, the support body having an abutment and an annular groove at opposite ends of the bearing ring, and a securing ring disposed in the groove and being radially expanded, the securing ring and the groove having co-operating inclined surfaces such that upon radial contraction of the securing ring, it urges the bearing ring towards the abutment, wherein the securing ring is endless.

- By having an endless securing ring, there is little or no chance of it becoming loose, and the axial load on the bearing ring, caused by contraction of the securing ring and the co-operating inclined or tapered surfaces, is annular and uniform.

- 80 The method may include providing the securing ring by injection moulding of plastics into the groove.

- After the bearing ring has been seated on the support body against the abutment, a mould is formed with die tools, the support body and the bearing ring about the annular groove. Plastics is injected into the mould and thus into the groove so forming an endless ring having an inclined or tapered surface. Upon cooling and / or curing of the plastics it shrinks causing the endless ring to contract radially. Upon radial contraction of the endless ring, the co-operating inclined or tapered surfaces of the endless ring and the groove cause the endless ring to force the bearing ring axially against the abutment. Moreover, the forces arising upon shrinking of the plastics cause a slight plastic deformation of the cross-section of the securing ring so that the force of the securing ring on the bearing ring is increased.

- 100 The method may include making the securing ring from an elastically deformable material, elastically deforming the securing ring and mounting it in the groove and subjecting the securing ring to treatment causing it to contract.

- 105 The securing ring is produced separately from the groove in the support body and from a material, such as a plastics, which is still slightly elastic after manufacture. After the bearing ring is seated on the support body, the prefabricated securing ring is expanded elastically, pushed on the support and into the annular groove. The securing ring contracts radially in the groove and lightly urges the bearing ring against the abutment. The securing ring in the groove can then be treated, for example, by being irradiated with ultra-violet light to completely cure the plastics and cause it to shrink and thus force the bearing ring against the abutment because of the inclined or tapered surfaces.

- 120 The method may include causing the securing ring to contract by physical, chemical or physico-chemical means.

- According to the type of material of the securing ring means such as heat, gases and corrosive fluids may be used to cause the material to shrink and the securing ring to contract.

The invention also provides, in combination, a support body and an annular pulley body mounted on and for rotation relative to the support body by

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a bearing having a bearing ring seated on the support body, in which the bearing ring has been fixed on the support body by a method according to the invention.

5 An embodiment of the invention will now be described by way of example and with reference to the accompanying drawing which shows half of a longitudinal section through a ball bearing mounted on a support body.

10 In the drawing a combination is shown of a support body 10 and an annular pulley body mounted on and for rotation relative to the support body by a bearing 11. The bearing 11 comprises inner and outer race rings 12 and 13 respectively and the annular pulley body comprises the outer race ring 13.

The support body 10 has a bore with an intumed flange 14 at one end defining an opening. At the other end, the support body 10 has an abutment in the form of an outwardly extending flange 15. The bearing inner ring 12 abuts the flange 15 and sits on a seating surface of the support body 10. The support body 10 has an annular groove 16, the seating surface being disposed between the groove and the flange 13, and the groove has an inclined or tapering conical surface 17 which converges with the axis in the direction towards the flange 15.

An endless securing ring 18 is provided in the groove 16 and also has an inclined or tapering conical surface 19, the conical surfaces 17 and 19 co-operating such that upon radial contraction of the ring 18 it is moved axially and forces the bearing ring 12 against the flange 15. The securing ring 18 is made of plastics and is provided by being injection moulded or cast in the groove 16, the bearing inner ring 12 and the support body 10 forming part of the surfaces of the mould or die. The plastics of the securing ring 18 shrinks during and/or after cooling and/or curing so that the securing ring radially contracts into the base of the groove 16. The endless securing ring 18 is not fully contracted into the groove 16, that is, is still slightly expanded, so that a force is maintained pressing the bearing ring 12 against the flange 15. The axial force is achieved partly by displacement of the securing ring 18, partly by plastic deformation of its cross-section as a result of the contraction during shrinking of the plastics.

## CLAIMS

1. In a method of assembling a combination of a support body and an annular pulley body mounted on and for rotation relative to the support body by a bearing having a bearing ring seated on the support body, the steps of fixing the bearing ring on the support body by:

(i) producing the support body having an abutment, a seating surface for the bearing ring and an annular groove, the seating surface being positioned between the abutment and annular groove, and the annular groove having an inclined surface converging with the axis in the direction towards the abutment;

65 (ii) mounting the bearing ring on the seating surface and against the abutment; and

(iii) providing a securing ring in the groove, the securing ring having an inclined surface co-operating with that of the groove such that upon contraction of the securing ring it moves towards the bearing ring, wherein the securing ring is endless and it contracts or is caused to contract whilst it is in the groove.

2. A method as claimed in Claim 1 including providing the securing ring by injection moulding of plastics into the groove.

3. A method as claimed in Claim 1 including making the securing ring from an elastically deformable material, elastically deforming the securing ring and mounting it in the groove and subjecting the securing ring to treatment causing it to contract.

4. A method as claimed in Claim 1, 2 or 3 including causing the securing ring to contract by physical, chemical or physico-chemical means.

5. In a method of assembling a combination of a support body and an annular pulley body mounted on and for rotation relative to the support body by a bearing having a bearing ring seated on the support body, the steps of fixing the bearing ring on the support body substantially as herein described with reference to and as shown in the accompanying drawing.

6. In combination, a support body and an annular pulley body mounted on and for rotation relative to the support body by a bearing having a bearing ring seated on the support body, in which the bearing ring has been fixed on the support body by a method as claimed in any preceding claim.

7. In combination, a support body, an annular pulley body mounted on and for rotation relative to the support body by a bearing having a bearing ring seated on the support body, the support body having an abutment and an annular groove at opposite ends of the bearing ring, and a securing ring disposed in the groove and being radially expanded, the securing ring and the groove having co-operating inclined surfaces such that upon radial contraction of the securing ring it urges the bearing ring towards the abutment, wherein the securing ring is endless.

8. A combination substantially as herein described with reference to and as shown in the accompanying drawing.